



Superbug infections

Act quickly to keep them in check

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Infections with “superbugs” such as vancomycin-resistant enterococci (VRE), methicillin-resistant *Staphylococcus aureus* (MRSA) and extended-spectrum β -lactamases (ESBL)-producing bacteria are on the rise in Canada and the rest of the world. MRSA has also expanded its range from a hospital-associated infection (HA-MRSA: hospital-associated MRSA) to the community (CA-MRSA: community-associated MRSA). The two have microbiologically distinct properties and can be differentiated accordingly.

It's important to distinguish colonization from infection with VRE and MRSA as the required therapeutic approach varies. Superbug infections call for a rapid implementation of the appropriate control practices and treatment strategies to keep them at bay. Prevalence and antibiotic susceptibility of resistant bacteria vary by hospital unit and geographical location, so local information is essential to determine the appropriate therapy. For further information on prevalence rates in Canada, please see the website of the Canadian Antimicrobial Resistance Alliance: www.can-r.ca.

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Risk factors

- recent and/or recurrent antibiotic therapy
- stay in a long-term care facility or recent hospitalization, especially when admitted to the intensive care unit (except for CA-MRSA)

VRE

- severe underlying disease or weakened immune system, surgery
- urinary catheters
- contact with a VRE-colonized patient

HA-MRSA

- hospitalization outside of Canada
- previous colonization or infection with MRSA
- proximity to an MRSA-colonized patient
- underlying conditions: chronic lung, liver or renal disease or malignancy

CA-MRSA

- indwelling medical devices
- presence of wounds/skin lesions
- the 5 Cs of CA-MRSA: Crowding, frequent skin Contact, Compromised skin, sharing Contaminated personal items, lack of Cleanliness
- chronic skin condition
- participation in contact sports
- intravenous drug use
- male homosexual intercourse
- previous MRSA colonization or infection
- First Nations people, children, military personnel and inmates are at increased risk

ESBL-producing bacteria

- indwelling devices such as arterial, central venous or urinary tract catheters and feeding tubes

Presentation

- VRE: any infection with *Enterococcus faecalis* or *E. faecium*, but infections are uncommon compared to colonization
- HA-MRSA: any infection with *S. aureus*
- CA-MRSA: any skin and soft tissue infection, often misdiagnosed as spider bites; also: reports of sepsis, necrotizing fasciitis, purpura fulminans, toxic shock syndrome, necrotizing pneumonia and empyema
- ESBL-producing bacteria: any infection with *Escherichia coli* or *Klebsiella* species

Red flags and diagnostic tests

VRE

- vancomycin resistance detected in *E. faecalis* or *E. faecium*
- *E. casseliflavus* and *E. gallinarum* are intrinsically resistant to vancomycin, so they aren't considered VRE

HA-MRSA

- standardized antimicrobial susceptibility testing: oxacillin/cefoxitin resistance screens for methicillin resistance
- latex agglutination methods or polymerase chain reaction (PCR) for methicillin resistance determinant

CA-MRSA

- susceptible to more antibiotics than HA-MRSA, so a more susceptible MRSA may suggest CA-MRSA: often susceptible to trimethoprim, sulfamethoxazole, doxycycline, ciprofloxacin and clindamycin
- specialized laboratories using typing methods can confirm the identification

ESBL-producing bacteria

- resistance to 3rd generation cephalosporins may suggest presence of an ESBL
 - consider all penicillins and cephalosporins resistant
 - the role for treatment with β -lactam/ β -lactamase inhibitor combinations is not clear

At home

- colonization with VRE is not harmful to healthy people, so no special precautions are needed unless the family member is a healthcare worker
- for all other infections: general hand-hygiene and household cleaning
- CA-MRSA: also cover draining lesions and don't share personal articles that may be contaminated

Treatment

VRE

- based on susceptibility testing:
 - ampicillin — *E. faecalis* is generally susceptible, *E. faecium* is generally resistant
 - consult an infectious disease (ID) specialist — linezolid, quinupristin-dalfopristin, tigecycline
- removal of urinary catheter or infected lines

HA-MRSA

- treatment of active infection based on susceptibility testing
 - vancomycin
 - consult ID — linezolid, quinupristin-dalfopristin, tigecycline

- decolonization therapy based on susceptibility testing: rifampin/doxycycline, chlorhexidine skin cleanser, mupirocin ointment

CA-MRSA

- skin and soft tissue infection: incision and drainage with or without antibiotics, depending on severity

- non-skin infections
 - based on susceptibility testing, but usually susceptible to clindamycin, trimethoprim/sulfamethoxazole or doxycycline (if > 8 years old)
 - if life-threatening, vancomycin, clindamycin, trimethoprim/sulfamethoxazole

- no current role for decolonization as most people aren't colonized with CA-MRSA prior to infection

ESBL-producing bacteria

- based on susceptibility testing
- don't use penicillins or cephalosporins
- fluoroquinolone resistance is common in *Klebsiella*